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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/531,499	11/18/2005	Mark Anthony Howard	142.020US01	8127

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EXAMINER	
SCHINDLER, DAVID M	

ART UNIT	PAPER NUMBER
2862	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No.	Applicant(s)
	10/531,499	HOWARD ET AL.
	Examiner	Art Unit
	David M. Schindler	2862

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 12 February 2007.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-21 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-7 and 9-21 is/are rejected.

7)☒ Claim(s) 8 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 2/12/07.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to the communication filed 2/12/2007.

Response to Arguments

2. Applicant's arguments filed 2/12/2007 have been fully considered but they are not persuasive.

With regard to applicant's arguments on page 1 and the top of page 2 of the Remarks, the Examiner respectfully disagrees. The Examiner notes that Doyle states that the two separate resonant circuits are separated in the axial direction of the cylinder by a distance (preferably equal to a quarter of the period of the sinusoidal response characteristic of the single winding), and that, as noted by applicant, the two resonant circuits are to be driven at different respective resonant frequencies (Page 20, Lines 15-24). From this, it appears, firstly, that each of the two resonant circuits has a distinct resonant frequency. To this, the Examiner directs applicants' attention to lines 22-32 of page 5 of applicant's specification and lines 1 of page 6 of applicant's specification. In this it is stated that a first resonant circuit 15a is separated from a second resonant circuit 15b by a distance d which is equal to L/4, so that as the sensor element 1 moves along the measurement direction the magnitude of the resonant signals induced in the

first and second resonant circuits vary in quadrature. Also stated is that a phase lag is also introduced between the excitation signal and the induced signal in each resonant circuit, that amount of the phase lag dependent upon the relationship between the frequency of the excitation signal and the resonant frequency of each resonant circuit.

Therefore, the Examiner notes that since the resonant circuits of Doyle each appear to have a distinct resonant frequency, these circuits would also introduce a phase lag between the excitation signal the induced signal in each resonant circuit. Furthermore, the Examiner notes that because the resonant circuits of Doyle are spaced apart from each other as noted above, it further appears that this feature would also introduce a phase lag. Therefore, the Examiner respectfully disagrees with applicant.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-7, 9-13, 15-19, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Doyle et al. (Doyle) (WO 00/77480 A2).

As to Claim 1,

Doyle discloses first and second members which are moveable relative to each other along a measurement path, the first member including an excitation winding and the second member including first and second resonators spaced apart along the measurement path ((Figure 1b) and (Page 20, Lines 7-29)), an excitation signal generator operable to generate an excitation signal and to apply the excitation signal to the excitation winding to induce a first resonant signal in the first resonator and a second resonant signal in the second resonator ((Page 11, Lines 1-16) and (Page 20, Lines 7-29)), an analyzer operable to analyze the first and second resonant signals to determine a value representative of the relative position along the measurement path of the first and second members ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Figure 2b)), wherein the excitation winding and the first resonator have a first electromagnetic coupling which varies with the relative position along the measurement path of the first and second resonator members in accordance with a first function, and the excitation winding and the second resonator have a second electromagnetic

coupling which varies with the relative position in accordance with a second function different from the first function ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Figure 2b)), and wherein the first resonator is operable to introduce a first phase shift into the first resonator signal and the second resonator is operable to introduce a second phase shift, which is different from the first phase shift, into the second resonant signal ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4)).

As to Claim 2,

Doyle discloses the analyzer includes a sensor winding electromagnetically coupled to the first and second resonators, wherein in response to the excitation signal being applied to the excitation winding, there is generated in the sensor winding an electric signal corresponding to a combination of the first and second resonant signals weighted in accordance with the relative position of the first and second members along the measurement path, and a signal processor operable to process the electric signal generated in the sensor winding to determine a value representative of the relative position along the measurement path of the first and second members ((Page 11,

Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4)).

As to Claim 3,

Doyle discloses the excitation winding and the first and second resonators are arranged so that the first and second functions vary sinusoidally with position with the same period but are out of phase with each other ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4)).

As to Claim 4,

Doyle discloses the first and second functions are one quarter of a cycle out of phase with each other (Page 20, Lines 17-19).

As to Claim 5,

Doyle discloses the first resonator exhibits resonance in response to a first range of frequencies about a first resonant frequency and the second resonator exhibits resonance in response to a second range of frequencies about a second resonant frequency which is different from the first resonant frequency, the first and second ranges overlapping, wherein the excitation generator is operable to generate an excitation signal having a frequency component which induces the first and

second resonant signals in the first and second resonators respectively (Page 20, Lines 7-29).

As to Claim 6,

Doyle discloses wherein the first phase shift is different from the second phase shift by one quarter of a cycle (Page 20, Lines 17-19).

As to Claim 7,

Doyle discloses the analyzer is operable to measure a phase of a signal formed by weighted combination of the first and second resonant signals ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4)).

As to Claim 9,

Doyle discloses the first and second members are relatively movable along a rectilinear direction ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4)).

As to Claim 10,

Doyle discloses the excitation winding is formed by a conductive track on a planar substrate (Claim 34).

As to Claim 11,

Doyle discloses the planar substrate is a printed circuit board ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page

13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4)).

As to Claim 12,

Doyle discloses the excitation winding effectively includes a plurality of loops arranged so that current flowing through the excitation winding flows around at least one of the loops in an opposite direction to at least one other of the loops ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4)).

As to Claim 13,

Doyle discloses at least one of the first and second resonators includes a passive resonant circuit ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4)).

As to Claim 15,

Doyle discloses the first and second resonators include respective conductive tracks formed on a planar substrate ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14; Lines 1-4) and (Claim 34)).

As to Claim 16,

Doyle discloses the planar substrate is a printed circuit board ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4) and (Claim 34)).

As to Claim 17,

Doyle discloses the sensor winding is formed by a conductive track on a planar substrate ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4) and (Claim 34)).

As to Claim 18,

Doyle discloses the sensor winding is formed on a printed circuit board ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4) and (Claim 34)).

As to Claim 19,

Doyle discloses the sensor winding is formed in a single loop ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4)).

As to Claim 21,

Doyle discloses first and second members which are moveable

relative to each other along a measurement path, wherein the first member including an excitation winding and a sense winding, wherein the second member including first and second resonators spaced apart along the measurement path ((Figure 1b) and (Page 20, Lines 7-29)), an excitation signal generator operable to generate an excitation signal and to apply the excitation signal to the excitation winding to induce a first resonant signal in the first resonator and a second resonant signal in the second resonator ((Page 11, Lines 1-16) and (Page 20, Lines 7-29)), an analyzer operable to analyze a sense signal induced in the sense winding by the first resonant signal and the second resonant signal, wherein the first electromagnetic coupling between the excitation winding and the sense winding via the first resonator is arranged to vary with the relative position along the measurement path of the first and second members in accordance with a first function, and a second electromagnetic coupling between the excitation winding and the sense winding via the second resonator is arranged to vary with the relative position along the measurement path of the first and second members in accordance with a second function different from the first function, and wherein the first resonator is operable to induce a first phase shift into the first resonant signal and the second resonator is operable to

induce a second phase shift which is different from the first phase shift, into the resonant signal ((Page 11, Lines 1-31) and (Page 20, Lines 7-29) and (Page 13, Lines 16-31) and (Figures 1b, 2a, 2b, and 3) and (Page 14, Lines 1-4)).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Doyle et al. (Doyle) (WO 00/77480 A2).

Doyle does not explicitly disclose the excitation signal includes a sinusoidal component at 1 MHz.

However, the Examiner notes that Doyle does disclose that the signal generator (80) generates an alternating excitation voltage having a fundamental frequency f0 (Page 13, Lines 6-8), and it would therefore be obvious to utilize any frequency, including 1MHz, so long as the frequency is matched to the resonant frequency of the resonant circuit (note lines 6-9, page 13).

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Doyle et al. (Doyle) (WO 00/77480 A2) in view of Teodorescu (5,986,549).

Doyle does not disclose at least one of the first and second resonators includes an amplifier for amplifying the power of a signal induced in the resonator.

Teodorescu discloses the use of an amplifier with a resonant sensor (Column 2, Lines 60-63).

It would have been obvious to a person of ordinary skill in the art to modify Doyle to include at least one of the first and second resonators includes an amplifier for amplifying the power of a signal

induced in the resonator given the above disclosure and teaching of Teodorescu in order to advantageously increase the signal to noise ratio of the resonant circuit.

Allowable Subject Matter

9. Claim 8 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David M. Schindler whose telephone number is (571) 272-2112. The examiner can normally be reached on Monday-Friday (8:00AM-5:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

David M. Schindler
Examiner
Art Unit 2862

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